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Minority ownership, deferral,  
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Abstract

When the foreign subsidiary has minority local ownership and the MNF engages in transfer pricing, its intrafirm exports are always from the country with the higher marginal cost. Further, permitting deferral from home taxation of non-repatriated foreign profits changes the nature of intrafirm trade from efficient to perverse even when the foreign subsidiary is fully-owned by the MNF. Intrafirm trade differs significantly from that between unrelated buyers and sellers, and tariffs on such trade (when it is perverse) can restore global production efficiency.

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## 1. INTRODUCTION

Foreign direct investment has been increasing rapidly throughout most of the world. A significant part of foreign direct investment is in horizontally-integrated activities (where these activities could be production of an intermediate or a final good, or a service); and a large part of international trade now consists of internal transactions between units of multinational firms (MNFs) located in different countries. For example, almost 40% of United States imports and exports in 1984 were between U. S. firms and their foreign affiliates/parents (see Little, 1987); approximately half of cars sold by Honda Motor Company in the U. S. are now built in the U. S. ; there has been a phenomenal growth in multinational banking, insurance and other financial services recently; and many resource-extracting or resource-based industries like crude-oil or petroleum products are often "multinational" in character. Also, a large number of foreign subsidiaries are not wholly owned by the MNFs; and many home countries defer home taxation of non- repatriated foreign profits.

Foreign direct investment has recently been analyzed in the literature using both partial and general equilibrium models of the multinational firm.<sup>1</sup> These models invariably assume or conclude that if the MNF undertakes internal real transactions, it is because of real cost differences. However, intrafirm trade can itself be used by the MNF as an 'international conveyor of profits.'<sup>2</sup> Then, factors like minority local ownership of the foreign subsidiary or deferral from home taxation of non-repatriated foreign profits can themselves induce the MNF to engage in internal real transactions.

The purpose of this paper is to examine real implications of the two factors mentioned above; i.e., whether minority ownership and/or deferral lead the MNF to export intrafirm from the higher cost country. Its Section 2 presents the model, defines minority local ownership and

examines the implications of foreign tax credit and deferral provisions for the effective statutory tax rate on profits earned in the foreign country. In Section 3 we analyze whether intrafirm trade is perverse (i.e. originating from the higher marginal cost country) when the home country permits deferral from home taxation of non-repatriated foreign profits. Section 4 presents different results when either deferral is not permitted or it is not in the MNF's interest to defer repatriation of its foreign profits. Section 5 examines how the introduction of tariffs changes the results given in the previous two sections, and compares quotas to tariffs. General implications of the results are presented in Section 6.

## 2. THE MODEL

Consider an MNF producing and selling a product in two countries. This product may be any of the following: a final good, an intermediate good, a service. It also exports part of its output from its unit in one country to that in the other. We permit intrafirm trade in either direction, i.e. the MNF's exporting unit could either be in the home country (country 1) or in the foreign country (country 2). The technology which makes such strategy optimum will be described below. The MNF has market power in the two countries, and the industry in which it operates has non-insignificant barriers to entry. We wish to examine the real implications of internal real transactions in the presence of minority foreign ownership and/or deferral.

Let  $\pi_i$ ,  $t_i$ ,  $s_i$ ,  $x_i$ ,  $R_i(s_i)$ ,  $C_i(x_i)$ ,  $r_i$ ,  $c_i$ , and  $c_i^l$  represent gross pure profits, statutory profit tax rate, sales, output, total revenue and total cost functions, marginal revenue and marginal cost functions and slope of the marginal cost function, respectively, in country  $i$ , and let  $T_i(1 - t_i)$ , where  $i = 1, 2$ .<sup>3</sup> First consider that the MNF exports a part of output of its unit in the home country - called the parent firm - to its subsidiary in the foreign country. Then,

$$\pi_1 = R_1(s_1) - C_1(s_1 + m) + pm, \quad (1)$$

$$\pi_2 = R_2(s_2) - C_2(s_2 - m) - pm, \quad (2)$$

where  $m$  are the MNF's imports into country 2 from country 1 and  $p$  is the transfer price. Clearly,

$x_1 = s_1 + m$ , and  $x_2 = s_2 - m$ . Assume  $s_2 > m > 0$ .

These individual pure profit functions are restated below for internal real transactions flowing in the other direction. Let  $m'$  represent amount of the foreign subsidiary's output which is now exported intrafirm to the parent firm. Then,  $x_1 = s_1 - m'$ ,  $x_2 = s_2 + m'$ ,  $s_1 > m' > 0$  ( by assumption ) and

$$\pi_1 = R_1(s_1) - C_1(s_1 - m') - pm', \quad (1')$$

$$\pi_2 = R_2(s_2) - C_2(s_2 + m') + pm', \quad (2')$$

Note that ( 1' ) and ( 2' ) can alternatively be obtained by substituting  $m = -m'$  in ( 1 ) and ( 2 ).

### Minority Ownership

Consider minority local ownership of the subsidiary. This could be due to foreign ownership restrictions (in at least some sectors or industries ) imposed by most countries. Some of the more prominent of these countries are: Argentina, Australia, Brazil, Canada, Colombia, Egypt, France, India, Indonesia, Japan, Korea, Mexico, Spain, Sweden and Venezuela. See Coopers and Lybrand ( 1993). Minority local ownership has been introduced by Kant ( 1988b and 1990) by a straight forward extension of the earlier MNF models. Let  $k$  be the proportion of the foreign subsidiary owned by the MNF, and assume

$$1/2 < k \leq 1.$$

The lower limit on  $k$  is imposed so that the MNF has full control over its foreign subsidiary: and the MNF owns its foreign subsidiary fully when  $k = 1$ .

### Foreign Tax Credit Scheme with Deferral

Under deferral, profits of a subsidiary are taxed by the home country only when such profits are repatriated to home. Then, under the foreign tax credit scheme (assumed in this

paper), the effective statutory rate on repatriated foreign profits is equal to sum of the two countries' statutory profit tax rates minus the foreign tax credit given by the home country. This is so because the home country taxes the repatriated foreign profits at its tax rate but gives a tax credit for foreign taxes paid. The rate at which the tax credit is given is the smaller of the two statutory tax rates.

Note that the effective statutory rate and the statutory rate are the same for home profits. Let  $t^e_2$  represent the effective statutory profit tax rate levied on pure profits earned in country 2. We wish to relate the magnitude of  $t^e_2$  to those of the statutory tax rates,  $t_i$ . First consider some non-repatriation. The MNF gains by not repatriating any part of its foreign profits only if  $t_1 > t_2$ . Let  $q$  represent the proportion of foreign profits repatriated, where  $0 \leq q < 1$ . The home tax on repatriated profit is then  $t_2 q$  and the foreign tax credit received is  $t_2 q$ . Clearly,

$$t^e_2 = t_2 + t_1 q - t_2 q = t_{2l}, \text{ where}$$

$$t_{2l} = t_2 + (t_1 - t_2)q \quad (3)$$

Now consider following two situations concurrently. Consider either that  $t_1 \leq t_2$  (so that the MNF does not gain by not repatriating its foreign profits fully), or  $t_1 > t_2$  but the home country does not permit deferral from home taxation of non-repatriated foreign profits. In either case, for

$$t_1 \geq t_2, t^e_2 = (t_1 + t_2) - t_2 = t_1, \text{ and for} \quad (4)$$

$$t_1 < t_2, t^e_2 = (t_1 + t_2) - t_1 = t_2, \quad (5)$$

To summarize, we have the following three cases: (A)  $t_1 > t_2$  and non-full repatriation (i.e.,  $q < 1$ ). Then,  $t^e_2 = t_{2l}$ ; (B)  $t_1 \geq t_2$  and either full repatriation (for  $t_1 = t_2$ ) or non-deferral from home taxation of non-repatriated foreign profits (for  $t_1 > t_2$ ). In that case,  $t^e_2 = t_1$ ; and (C)  $t_1 < t_2$  where

$t_2^e = t_2$ . Case (A) is discussed in the following section. On the other hand, different results for the other two cases are presented in Section 4.

### 3. $t_1 > t_2$ WITH DEFERRAL

First the case of minority foreign ownership of the subsidiary and then that of full ownership by the MNF over its foreign subsidiary are discussed.

#### A. Minority Local Ownership

Let  $\pi$  represent the MNF's global net profit function. Then,

$$\pi = T_1 \pi_1 + T_{21}k \pi_2, \text{ where} \quad (6)$$

$$T_{21} = (1 - t_{21}) = (1 - t_1) + (t_1 - t_2)(1 - q) > 0. \quad (7)$$

Consider first that the direction of intrafirm trade is from the parent firm to the foreign subsidiary so that the two individual profit functions are defined by (1) and (2), respectively.

Then, the partial derivative of  $\pi$  with respect to  $p$  is

$$\pi_p = (T_1 - T_{21}k)m = T_m \text{ where } T = (T_1 - T_{21}k) \quad (8)$$

But  $T$  can also be stated as :

$$T = (1 - t_1)(1 - k) - k(t_1 - t_2)(1 - q). \quad (9)$$

The two terms on the right hand side of (9) are respectively positive and negative, and the sign of  $T$  is indeterminate. Assume it to be non-zero. First consider the  $T > 0$  case. An increase in  $p$  increases the parent firm's (the subsidiary's) export revenues (import costs). But, only the  $k$ -proportion of the subsidiary's import costs are borne by the MNF [with  $(1 - k)$  proportion borne by local shareholders in the foreign country], while the export revenues accrue wholly to the parent firm. Therefore, an increase in  $p$  transfers pure profits from local shareholders in the foreign country to the parent firm. This positive effect - called the minority local ownership effect - is captured by the first term on the right hand side of (9). On the other hand,  $(t_1 - t_2)(1 -$

$q)k$  measures the global profit tax savings by the MNF due to non-full repatriation of its share of foreign profit. An increase in  $p$ , by decreasing  $\pi_2$ , reduces this tax-saving effect and hence decreases  $\pi$ . This negative effect-called the deferral effect-is measured by the  $[-k(t_1 - t_2)(1 - q)]$  term in (9).

When  $T < 0$ , a decrease in  $p$  decreases the parent firm's (the subsidiary's) export revenues (import costs). By analogous reasoning as above, the minority local ownership effect now means a shift of pure profits from the parent firm to local shareholders in the foreign country. The deferral effect is now interpreted as follows: a decrease in  $p$ , by increasing  $\pi_2$ , increases the tax savings effect of not repatriating  $\pi_2$  fully to the home country, and hence increases  $\pi$ .

Clearly, in the case of a positive ( negative)  $T$ , the minority local ownership effect dominates ( is dominated by ) the deferral effect. If there were no prospect of a transfer pricing penalty, in the former ( latter) case the MNF would be interested in increasing (decreasing) its transfer price as much as possible. Following Kant ( 1988a), consider now that the MNF faces the prospect of imposition of a penalty where the probability,  $\alpha$ , of the penalty depends on the transfer price declared by it. Assume that the government has a guideline that the transfer price should be equal to the arm's length price,  $\hat{p}$ . If the MNF charges  $\hat{p}$  there is no threat of the penalty, and  $\alpha = 0$ . If it does not charge the arm's length price, a transfer pricing penalty can be imposed on it; i.e. in that case  $\alpha$  is positive.

The probability of imposition of the penalty depends on the divergence between the transfer price charged and the arm's length price, i.e.,  $\alpha = \alpha(p - \hat{p})$ . Let  $p_e$  be the transfer price which triggers the transfer pricing penalty with certainty, i.e. where  $\alpha = 1$ . As  $p$  gets closer to  $p_e$ , the probability of promulgation of the penalty increases, and assume it increases at an increasing rate. Thus, for increase in the transfer price (ITP) case,

$$\text{for } \hat{p} < p < p_e, 0 < \alpha(p - \hat{p}) < 1, \alpha'(p - \hat{p}) > 0, \alpha''(p - \hat{p}) > 0, \quad (10)$$



while for decrease in the transfer price ( DTP) case,

$$\text{for } \hat{p} > p > p_e, 0 < \alpha(p - \hat{p}) < 1, \alpha'(p - \hat{p}) > 0, \alpha''(p - \hat{p}) > 0 \quad (11)$$

Clearly,

$$\text{sign } \alpha'(p - \hat{p}) = \text{sign } T. \quad (12)^5$$

Let  $\zeta > 0$  represent the transfer pricing penalty. Then. the expected loss due to the penalty is:

$$\zeta \alpha(p - \hat{p}) + 0.[1 - \alpha(p - \hat{p})] = \zeta \alpha(p - \hat{p}) > 0. \quad (13)$$

Therefore, the objective function of the MNF,  $\phi$  . and the first-order condition with respect to  $p$  are:

$$\phi = \pi - \zeta \alpha(p - \hat{p}), \text{ and} \quad (14)$$

$$\phi_p = T_m - \zeta \alpha'(p - \hat{p}) = 0 \quad (15)$$

The last equation differs from similar equations in other MNF models in showing that the derivative of the MNF's objective function with respect to  $p$  does not have the same sign for all permissible values of  $p$ . Clearly. the MNF may not find it optimal to charge the corner or the limiting transfer price. In the  $T > 0$  case. the first term on the right hand side of ( 15 ) is positive, and the MNF has incentive to increase its transfer price. But, an increase in the transfer price also increases the probability of the transfer pricing penalty. This negative effect on  $\phi$  is measured by the  $[-\zeta \alpha'(p - \hat{p})]$  term in (15). Only if the former effect dominates the latter for all permissible values of  $p$ , will the optimum transfer price be the corner or the limiting transfer price. But, due to the increasing probability of the penalty ( which increases at an increasing rate), the more likely outcome is that the optimum transfer price is in the interior, i.e., between  $\hat{p}$  and  $p_e$ .

Similarly, for the DTP case. Hirshleifer ( 1957 ) proved that the arm's length price,  $\hat{p}$  equals  $c_1$ . Thus, in the ITP ( DTP) case, the MNF's optimum transfer price,  $p$ , is greater (less) than the exporting country's marginal cost. Thus,

$$\text{sign} ( p - c_1 ) = \text{sign} T. \quad (16)$$

Now, analyze the first-order condition with respect to intrafirm trade. Call intrafirm trade efficient if the two marginal costs are equal in equilibrium. On the other hand, term it perverse (restricted) if the MNF's profits are maximized at a level of internal transactions such that the exporting unit has the higher ( lower) marginal cost. Whether intrafirm trade is efficient, perverse or restricted is examined below by stating the partial derivative of  $\phi$  with respect to  $m$  as:

$$\phi_m = (p - c_1)T - T_{21}(c_1 - c_2)k, \quad (17)^6$$

while the second order (sufficient) condition with respect to  $m$  is:

$$\phi_{mm} = -T_1c_1 - T_{21}kc_2 < 0. \quad (18)$$

If differences in production functions and input-rentals in the two countries are allowed, then (18) requires that long-run marginal costs must be increasing at equilibrium in at least one country. Thus, one set of necessary and sufficient conditions under which the MNF will find it optimum to horizontally integrate in the two countries and undertake intrafirm trade is that the home country has decreasing or constant costs (increasing or constant returns to scale) at equilibrium, the foreign country has increasing costs (decreasing returns to scale), and the  $k$ -proportion of after-tax rate of increase in marginal cost in the foreign country is greater than the after-tax rate of decrease (if any) in marginal cost in the home country.

On the other hand, if production functions and input-rentals are identical in the two countries, then (18) rules out increasing or constant returns to scale (decreasing or constant costs)

at equilibrium in both the countries. Helpman (1984) and Markusen (1984) assume that inputs like R & D, advertising, marketing, distribution, management, finance and organization used in one plant or facility serve at zero marginal cost additional plants/facilities, and thereby give rise to increasing returns to scale. This assumption is likely to be quite valid for R & D. But inputs like advertising, marketing, distribution, management, finance and organization cannot serve additional plant/facility located in a possibly distant country (with likely different language, culture, legal system and industrial relations) at zero marginal cost.<sup>7</sup> Further, if all stages of production before final sale (in particular, if transportation and retailing costs) are included, decreasing returns to scale (increasing costs) from "production" (as interpreted above) of a product/variety from a single facility globally are also quite likely.<sup>8,9</sup>

Now we analyze equation (17). Consider again the ITP case first. In view of (16), both increase in the transfer price and internal real transactions shift profits from the foreign to the home country [and the first term in (17) is unambiguously positive]. Therefore, lower marginal cost in the exporting country, i.e. a negative  $(c_1 - c_2)$ , is not a necessary condition (although it is a sufficient condition) for the MNF to export from there (for  $\phi_m$  to be positive initially), and the MNF finds such trade profitable even if  $c_1 - c_2$  Further, a necessary condition for the MNF to achieve its trading equilibrium is:

$$(c_1 - c_2) = (p - c_1)T / T_2 k, \quad (17')$$

that is, only if internal real transactions are perverse. In the ITP case being discussed, the minority local ownership effect dominates the deferral effect. Clearly, in this case, minority local ownership over the subsidiary encourages intrafirm trade (by either increasing home production or decreasing foreign production or both) beyond the efficient level. Exporting from country 1 wastes real resources while, at the same time, increasing the global profit tax burden on the

MNF. But the shift of pure profits from local shareholders in the foreign country through intrafirm trade more than compensates the MNF for both these negative effects. Lastly, the higher are the transfer price and the proportion,  $q$ , of foreign profits repatriated, and the lower are the proportion,  $k$ , of the foreign subsidiary owned by the MNF, and the statutory profit tax rate differential,  $(t_1 - t_2)$ , the greater is the extent of perverse internal real transactions.

Consider now the negative  $T$  case. As shown above, in this case the MNF's optimum transfer price is smaller than  $c_1$ . and results similar to the ITP case follow. In this case, both decrease in the transfer price and intrafirm trade [by creating negative net export revenue,  $(p - c_1)$ , in the home country] shift profits from the home to the foreign country. But, the gain due to deferral from home taxation at the higher home rate of profits shifted to the foreign country dominates both the resulting shift of pure profits to foreign shareholders and the increased overall production costs. Further, the lower are the transfer price and  $q$ , and the higher are  $k$  and  $(t_1 - t_2)$ , the greater is the extent of perverse intrafirm trade.

Now consider that internal real transactions are in the other direction, i.e. from the foreign subsidiary to the parent firm, In that case, the expression for the MNF's global net profit function remains the same as (6). But, the individual pure profit functions,  $\pi_1$  and  $\pi_2$ , in (6) are now defined by (1') and (2'), respectively [rather than by (1) and (2) as earlier]. The partial derivative of  $\pi$  with respect to  $p$  is now:

$$\pi_p = - (T_1 - T_2 k) m' = - T m' = T' m', \text{ where} \quad (8')$$

$$T' = - T. \quad (19)$$

If  $T'$  is positive, i.e., if  $T$  is negative and the deferral effect is greater than the minority local ownership effect, the MNF increases its transfer price on its exports (now) from the foreign subsidiary so as to shift profits to the foreign country. Vice versa when  $T'$  is negative. The

definition and properties of the probability of penalty function, the expression of the objective function and the first order conditions with respect to  $s_1$  and  $s_2$  are the same as before. The expression and the analysis for  $\phi_p$  is similar with  $T'm'$  replacing  $Tm$ . The arm's length price now equals  $c_2$ , and

$$\text{sign} ( p - c_2 ) = \text{sign} T' . \quad (16')$$

Further,

$$\phi_{m'} = - \phi_m \text{ and } \phi_{mm'} = \phi_{mm} \quad (20)$$

and the discussion in the two paragraphs following (18) still holds. Lastly, restate  $\phi_{m'}$  as:

$$\phi_{m'} = (p - c_2)T' - T_1(c_2 - c_1), \quad (21)$$

so that at the trading equilibrium,

$$(c_2 - c_1) = (p - c_2)T' / T_1 \quad (21')$$

Similar conclusions as above about perverse internal real transactions hold. Exporting intrafirm from country 2 wastes real resources. But, in the ITP case, reduction in the MNF's global profit tax burden due to shift of profits to the lower- tax foreign country more than compensates the MNF both for the higher overall production costs and the shift of profits from the parent firm to foreign local shareholders. Vice versa in the DTP case. Further, in the ITP ( DTP) case, the higher (lower) are  $p$ ,  $k$  and  $(t_1 - t_2)$ ; and the lower (higher) is  $q$ , the greater is the extent of perverse intrafirm trade.

It may be noted that the parent firm need not be wholly owned by the MNF. Similar results follow when the MNF does not own the parent firm fully but its controlling owners own a greater share of the parent firm than of the subsidiary. Then, the following proposition summarizes the above discussion:

PROPOSITION 1: (A) *When the MNF defers repatriation of ( some or all of) its foreign profit and when its controlling owners own a greater share of the parent firm than of the foreign subsidiary, lower marginal cost in the exporting country is not a necessary condition for the MNF to undertake internal real transactions, and its profits are maximized only if the exporting country has the higher marginal cost.*

(B) *Further, in the ITP case, when the home [foreign ] country is the exporting country, the higher are the transfer price and  $q$  [and  $k$  and  $(t_1 - t_2)$ ], and the lower are  $k$  and  $(t_1 - t_2)$  [is  $q$ ], the greater is the extent of perverse intrafirm trade. On the other hand, in the DTP case, when exports originate from the home [foreign ] country, the extent of the perverse internal real transactions is greater the lower are the transfer price and  $q$  [and  $k$  and  $(t_1 - t_2)$ ], and higher are  $k$  and  $(t_1 - t_2)$  [is  $q$ ].<sup>10</sup>*

## **B. Whole Ownership of the Foreign Subsidiary:**

Consider now that the foreign subsidiary is wholly-owned by the MNF (with  $t_1 > t_2$  and deferral). In that case,  $k = l$ , the minority foreign ownership effect vanishes and  $T$  is clearly negative. When the parent firm (foreign subsidiary) is the exporting unit, the MNF is now only interested in decreasing (increasing) its transfer price. In either case, profits are shifted to the lower tax foreign country.

The conclusions about perverse intrafirm trade stated in Proposition 1A hold even if, as now, the extent of ownership by the controlling owners in the two units of the MNF is the same (except that now internal real transactions shift profits within the MNF only rather than also from/to foreign shareholders). Proposition 1B is modified as follows: when exports originate from the home (foreign) country the extent of the perverse intrafirm trade is greater the lower (higher) is the transfer price, the lower is  $q$ , and the higher is  $(t_1 - t_2)$ .

As an illustration of this phenomenon, consider that U.K. permits deferral from its taxation of non-repatriated foreign profits, and British Petroleum exports petroleum products to its fully-owned subsidiary in lower-tax Singapore. Under these conditions, British Petroleum decreases the transfer price (on this internal trade), pure profits are shifted to Singapore, and marginal cost of production is higher in U.K. at equilibrium. Clearly, gain due to deferral from U.K.'s taxation of profits shifted to Singapore through intrafirm trade compensates British Petroleum for exporting intrafirm from its higher marginal cost unit.

#### 4. CASES WITHOUT DEFERRAL

This section presents different results for the other two cases. These are: (B)  $t^e_2 = t_1$  which results when  $t_1 \geq t_2$  and either the MNF repatriates its foreign profits to the home country fully (for  $t_1 = t_2$ ) or the home country does not permit deferral from home taxation of non-repatriated foreign profits (for  $t_1 > t_2$ ); and (C)  $t^e_2 = t_2$  which occurs when  $t_1 < t_2$ . Give a wider meaning to  $q$ : let  $q$  now represent the proportion of foreign profits taxable at home (whether repatriated or not). Clearly,  $q = 1$  for both (B) and (C).

##### **A. Case $t_1 \geq t_2$ with No Deferral**

In this case, the effective statutory profit tax rate equals  $t_1$  for profits earned in either country. Now the deferral effect vanishes. Equate  $q = 1$  and substitute  $t_1$  for  $t_2$  in various expressions in Section 3. When the foreign subsidiary has minority local ownership,  $T$  equals  $(1 - t_1)(1 - k)$ , and is unambiguously positive. In that case, when the exporting unit is the parent firm (foreign subsidiary), the MNF increases (decreases) its transfer price to a level higher (lower) than the marginal cost in the home (foreign) country. Now, the shift of pure profits to the MNF from foreign shareholders (irrespective of the direction of intrafirm trade) more than

compensates the MNF for exporting from the higher marginal cost country; and the lower is  $k$ , the greater is the extent of the perverse intrafirm trade.

For example, consider that the profit tax rates in Germany and France are equal; . and Siemens, Germany exports air-traffic management systems to its not-wholly owned subsidiary in France. Then, Siemens increases its transfer price; and the shift of pure profits from local shareholders in France through intrafirm trade more than compensates Siemens for exporting from its higher marginal cost German unit.

On the other hand, when the foreign subsidiary is wholly owned by the MNF, the foreign local ownership effect also disappears,  $T$  equals zero, and the MNF would have no reason to engage in transfer pricing. In fact, in view of the probability of the penalty function with positive expected value, it chooses the arm's length transfer price,  $\hat{p}$ . Further, irrespective of the direction of internal real transactions, marginal cost must be lower for such exports to originate in a country, and the MNF achieves its optimum only if the two marginal costs are equal; i.e., only if intrafirm trade is efficient.

The last conclusion, and those from Section 3.B above can now be combined. The last paragraph above shows that internal real transactions are efficient when  $k = q = 1$ ; while Section 3.B demonstrates that deferral (with  $k = 1$ ) results in perverse intrafirm trade. Thus, we can state:

**PROPOSITION 2:** *Consider that the foreign subsidiary is wholly-owned by the MNF. Then, permitting deferral from home taxation of non-repatriated foreign profits changes the nature of intrafirm trade from efficient to perverse.*

#### **B. Case $t_1 < t_2$**

In this case, we substitute  $t_2$  for  $t_{21}$  while, as before, we equate  $q$  to 1. Again, when



exports originate from the home (foreign) country, the MNF only increases (decreases) its transfer price, and profits are shifted to the home country in either case. Proposition 1A continues to hold and is, in fact, strengthened because now global profit tax savings (since the home country has the lower tax rate) also compensate the MNF for exporting from the higher marginal cost unit. In addition, we have that the greater is  $(t_2 - t_1)$ , and the lower is  $k$ , the greater is the extent of the perverse internal real transactions. Lastly, even if the foreign subsidiary is wholly owned by the MNF (and there is no deferral), we have perverse intrafirm trade.

As an example, consider the export of cars by Ford, U.S.A. to, say, its wholly- owned subsidiary in the higher-tax U.K. Ford increases its transfer price; and perverse internal real transactions are explained by the shift of pure profit from Ford's wholly-owned unit in U.K. to Ford, U.S.A.

Box 1 below summarizes the conclusions about perverse intrafirm trade.

	$t_1 \geq t_l$		$t_1 < t_2$ ( $q = l$ )
	Deferral	No Deferral ( $q = l$ )	
Minority Ownership	Perverse	Perverse	Perverse
Whole Ownership	Perverse	Efficient	Perverse

### **Box 1.** Nature of Intrafirm Trade

We also have the following generalization of Proposition 1A; and state Proposition 3 (which is somewhat similar to Proposition 1B):

**PROPOSITION 1A':** *The MNF need not have lower marginal cost in the exporting country to export intrafirm ( it finds internal real transactions profitable even if the two marginal costs are equal), and it achieves its maximum profits only when the exporting country has the higher*

marginal cost. The only exception to these results is when  $t_1 \geq t_2$ , the foreign subsidiary is wholly owned by the MNF and the home country does not permit deferral from home taxation of non-repatriated foreign profits.

**PROPOSITION 3:** *The extent of perverse internal transactions is greater, the greater the optimum transfer price diverges from the marginal cost in the exporting country. When  $t_1 \geq t_2$ ,  $0 \leq q < 1$  and  $k = 1$ , this extent is greater the lower is the proportion,  $q$ , of foreign profits repatriated by the MNF, and the higher is  $(t_1 - t_2)$ . When  $q = 1$  and  $1/2 < k < 1$ , it is greater the lower is the proportion,  $k$ , of the foreign subsidiary owned by the MNF. Lastly, when  $t_2 > t_1$ , it is greater the greater is  $(t_2 - t_1)$ .*

## 5. TARIFFS AND QUOTAS

Consider now tariffs and quotas as policies to counteract perverse intrafirm trade. First consider tariffs. Then compare quotas to tariffs. To give a motivation for introducing tariffs in our model, we first show the effect of tariffs both when the foreign subsidiary is wholly owned by the MNF and either there is full repatriation or there is no deferral, i.e.,  $k = q = 1$ . First consider  $t_1 \geq t_2$ . Recall in this case  $t_2 = t_1$ . For the case of exports originating from the parent firm, we have

$$\pi^* = T_1[R_1(s_1) - C_1(s_1 + m) + R_2(s_2) - C_2(s_2 - m) - pm\tau], \quad (22)$$

where  $\pi$  is the MNF's global net profit function under the stated conditions and  $\tau$  is the ad valorem tariff rate on imports in country 2. The MNF decreases its transfer price so as to save on tariff payments. The definition and properties of the probability of the penalty function remain unchanged. Let  $\phi$  represent the objective function under these conditions. Then,

$$\phi_m^* = T_1[(c_2 - c_1) - p\tau]. \quad (23)$$

Similar expression can be derived when exports go from the foreign subsidiary to the parent firm and the home country has a tariff on imports. In either case, the exporting country must have lower marginal cost both for the MNF to export from there, and at the trading equilibrium (i.e., we have restricted internal real transactions). Clearly, restricted intrafirm trade is smaller than efficient intrafirm trade. This suggests that imposition of tariffs in a situation of perverse internal real transactions (i.e. when the volume of intrafirm trade is greater than the "efficient" level) may eliminate such perverse trade. This is analyzed below first for the deferral case and then for the cases without deferral.

### **$t_1 > t_2$ with Deferral**

Let  $\pi^\tau$  represent the MNF's global net profit function in the presence of all of the following: tariffs, minority foreign ownership and deferral provisions. Define  $\tau^* = (1 + \tau)$ , and redefine gross profits in country 2 as:

$$\pi_2^\tau = R_2(s_2) - C_2(s_2 - m) - p \tau^* m. \text{ Then,} \quad (2'')$$

$$\pi^\tau = T_1 \pi_1 + T_2 k \pi_2^\tau, \quad (6')$$

$$\pi_p^\tau = (T - T_2 k \tau) m = (T_1 - T_2 k \tau^*) m, \quad (8')$$

where  $T$  is defined by (9) above. From (7) ,

$$T_2 l = (l - t_2 l) = T_1 + (t_1 - t_2)(l - q) > T_1,$$

(since  $t_1 > t_2$ ). Then, from (8''), the MNF decreases its transfer price when  $k\tau^*$  is either greater than or equal to one. When it is smaller, its exact transfer pricing strategy is ambiguous. The objective function is now termed  $\phi^\tau$ , and its partial derivative with respect to  $m$  can be stated as:

$$\phi_m^\tau = (T_1 - T_2 k \tau^*)(p - c_1) - T_2 (c_1 \tau^* - c_2) k. \quad (17')$$

Similar expression can be derived when internal real transactions are in the other direction and the home country has a tariff on imports.. Irrespective of the direction of intrafirm trade, for both

the ITP and the DTP cases, a positive sign of this partial derivative has no implications for the signs of both  $(c_1\tau^* - c_2)$  and  $(c_1 - c_2)$ : in spite of tariffs, intrafirm trade may be perverse. Identical conclusions hold for the trading equilibrium.

### Cases Without Deferral

Conditions for ITP and DTP are different in these cases. In case (B),  $t_2^e = t_1$  and the equation corresponding to (8'') is:

$$\pi_p^r = T_1[(1 - k) - k\tau]m = T_1(1 - k\tau^*)m \quad (8''')$$

$(1 - k)$  in (8''') gives the effect of minority foreign ownership on  $\pi^r$  (and is positive) while  $(-k\tau)$  gives that of tariffs (and is negative). If the former effect is greater (smaller) than the absolute value of the latter, i.e.  $k\tau^*$  is smaller (greater) than 1, the MNF increases (decreases) its transfer price.

In case (C),  $t_2^e = t_2$ ; and the partial derivative of  $\pi^r$  with respect to  $p$ , obtained by replacing  $T_{21}$  by  $T_2$  in equation (8''), is:

$$\pi_p^r = (T_1 - T_2k\tau^*)m \quad (8''')$$

Now, the MNF increases its transfer price when  $k\tau^*$  is either less than or equal to one. When it is greater, it may either increase or decrease its  $p$ .

However, conclusions about perverse internal real transactions in both cases (B) and (C) - i.e., when  $q = 1$  - are identical to those presented for the deferral with tariffs case above. Then, we have the following proposition:

**PROPOSITION 4:** *The imposition of tariffs on intrafirm imports by one unit of the MNF from the other can lead to the restoration of efficient internal real transactions from the initial situation of where they are perverse*

Now we compare import quotas to tariffs. Although the effect of an import quota on the volume of intrafirm trade, and on whether efficient internal real transactions are restored, is the same as that of tariffs, the following considerations make quotas an inferior policy. First consider who gets the quota rents. If quota rights are given away to importers or if they are auctioned, then importers or the importing country's government, respectively, get the quota rents. But, if they are given away to the exporting country [as under the widely prevalent voluntary export restraint ( VER) agreements], then quota rents accrue to exporters. In that case, import quotas are more costly to the importing country than equivalent tariffs.

Further, in our model, the unit in the importing country has market power. Under such situation, as shown by Bhagwati (1965), this unit will charge higher prices and produce less under quota protection than under tariff protection. Lastly, tariffs are easier to administer than quotas, lead to less corruption, lobbying and chasing of the valuable quota rents and act at the source of this perverse intrafirm trade.<sup>11</sup>

## 6. CONCLUSIONS

We have shown above that permitting deferral from home taxation of non-repatriated foreign profits changes the nature of internal real transactions from efficient to perverse even when the foreign subsidiary is fully-owned by the MNF. Further, if the foreign subsidiary has minority local ownership and the MNF engages in transfer pricing, its intrafirm exports are always from the country with the higher marginal cost.<sup>12</sup> Since most tax codes have deferral provisions, and since less than wholly-owned subsidiaries constitute a large and increasing proportion of total MNF activities, perverse intrafirm trade cannot be ignored.

Ethier (1986) has recently suggested that internalization is the only one of the three key elements—ownership advantages, locational considerations and internalization of international

transactions - explaining foreign direct investment not already incorporated into trade theory.

This paper suggests that shifting pure profits from local portfolio equity investors in the foreign country or adopting overall tax-minimisation strategies can themselves be powerful motives for undertaking internal transactions; and it draws real implications of such internal transactions.

Helleiner and Lavergne (1979) and Helpman and Krugman (1985) pose the question (but do not provide an answer) whether intrafirm trade differs significantly from that between unrelated buyers and sellers. This paper gives an affirmative answer to that question.

This paper also points out some policy dilemmas for governments in the world populated by MNF's. We have shown that tariffs can restore efficient intrafirm trade from a situation where it is perverse otherwise; and stated why tariffs are superior to quotas. An alternative could be to ensure that the MNF always charges a transfer price equal to the arm's length price. Although success in forcing the transfer price to equal the marginal cost of the exporting unit. eliminates perverse internal real transactions, such success will be difficult to achieve: it is very hard for governments to determine the arm's length price. For example, the U.S. has one of the most stringent regulations (Section 482 of the tax code ) on transfer pricing. Still. the U.S. Internal Revenue Service is fighting a losing battle to enforce compliance with these regulations.<sup>13</sup>

Lastly, although our discussion has been in terms of a multinational firm. the part of our analysis above pertaining to less than wholly owned subsidiary applies to any ( purely ) domestic firm which has two or more units with the controlling owners having a greater ownership in one unit than the other. With the recent surge of mergers and acquisitions i n many countries. there are likely to be considerable incentives to engage in internal transactions which violate real cost advantages.

## END NOTES

<sup>1</sup>See Horst (1971), Katrak (1977 and 1980), Eden (1978), Batra and Hadar (1979), Batra and Ramachandran (1980), Itagaki (1981), Markusen (1984), Helpman (1984), Ethier (1986), Kant (1988a and 1988b), Horstmann and Markusen (1987 and 1989), Ethier and Horn (1990), Stoughton and Talmor (forthcoming) and Gresik and Nelson (forthcoming). Most of these models consider or allow for an horizontally-integrated MNF

<sup>2</sup>The terms "internal real transactions" and "intrafirm trade" are used interchangeably in this paper.

<sup>3</sup>It is worth emphasizing that pure profits here means total revenue minus total cost (including opportunity cost of owned capital) minus normal profits in the respective country. Further, we assume that accelerated capital cost recovery allowances, investment tax credits, other deductions or exemptions, and reduced tax rates or outright subsidies granted for particular activities or regions in most tax codes make the taxable profits approximately equal to pure profits so that the statutory profit tax rate is levied and realized on pure profits.

<sup>4</sup>This paper does not go into the bargaining problem between local minority shareholders and the parent firm. For an analysis of this problem, see Stoughton and Talmor (forthcoming). Lee (1990) and Miyagiwa (1992) also examine the effects of foreign shareholding. But, their model assumes foreign equity investment to be portfolio rather than direct so that either country's firm maximizes its own profit function rather than the joint or the global profit function.

<sup>5</sup>The formulation of the probability of penalty function is general, and it may apply to either country. Similarly, it is assumed that either due to international convention or otherwise, both the countries adopt the same definition of arm's length price.

<sup>6</sup>The first order conditions with respect to  $s_1$  and  $s_2$  give the familiar condition that marginal cost equals marginal revenue in each country. A change in  $m$  first changes  $c_1$ . To maintain marginal cost and marginal revenue equality  $s_1$  must change. Further,  $m$  also affects the first term on the right hand side of (15), and hence  $p$ ; and from (17),  $p$  also affects  $m$ . Thus,  $m$ ,  $s_1$ ,  $s_2$ , and  $p$  are all determined simultaneously.

<sup>7</sup>Markusen (1984) recognizes that increasing returns to scale may be weak, and horizontal integration takes place due to factor-intensity differences.

<sup>8</sup>Trade theory generally considers transport costs and tariffs together as if they have identical effects on comparative advantage. But marginal tariff costs remain constant while marginal transport costs are likely to increase as a single product/variety of a product is transported to ever farther consuming centers. In addition, retailing costs are incurred at numerous final sale points distributed all over the globe; and are likely to be significantly positive in non-purely competitive markets. Then, transport and retailing costs can be considered as natural barriers to increasing returns to scale of "producing" a product/variety from a single plant/facility globally.

<sup>9</sup>Horstmann and Markusen (1989) also use transportation/tariff costs to explain horizontal integration. In addition, Ethier and Horn (1990) suggest that increasing costs of "managerial control", and possibly increasing costs of interfacing with host country with different language, culture, legal system and industrial relations can lead to horizontal integration.

<sup>10</sup>Although the model presented above envisages the production of only one good (whether final or intermediate) of service, identical results follow if the MNE produces both the intermediate and the final good or the service and engages in internal real transaction of the



product which is produced in both the countries; except that when both the intermediate and the final good are produced in both the countries and the final good is exported intrafirm, for the MNF to achieve its optimum, the composite marginal cost (i.e. the sum of marginal costs of producing the intermediate and the final good) must be higher in the exporting country.

<sup>11</sup>Tariffs act at the source of perverse intrafirm trade in the following way: perverse intrafirm trade arises because the MNF's internal real transactions shift pure profits from either the foreign shareholders or the higher tax foreign country. or. under deferral from home taxation of non-repatriated foreign profit. from the higher tax home country. Due to any one (or more) of these gains. intrafirm trade is increased beyond the efficient level. The increase in the MNF's portion of costs in the importing country due to tariffs counter-acts all these gains to the MNF. Lastly. a subsidy on such exports worsens perverse intrafirm trade because it expands intrafirm exports further beyond the efficient level.

<sup>12</sup>These results imply that linkages between domestic costs and direction of intrafirm trade breakdown either when the MNF operates under deferral provisions. or it does not fully own its foreign subsidiary: and conclusions drawn on the assumption of a fully owned subsidiary or the absence of profit tax differentials cannot be *assumed* to extend to the world of subsidiaries with minority foreign ownership or of profit tax differentials.

<sup>13</sup>See Goldberg ( 1990) and Heck (1990).

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